February 22, 1967

SUMMARY OF GROUNDWATER CONDITIONS AT FIVE CITIES IN NORTHERN ILLINOIS

by

Ellis W. Sanderson, Assistant Hydrologist

This summary of the availability of groundwater for an industrial supply in the vicinity of Joliet, Morris, Ottawa, Henry, and Fulton is prepared at the request of Mr. Dick Dandurand, Department of Business and Economic Development, 30 North LaSalle Street, Room 808, Chicago, Illinois 60602.

JOLIET, WILL COUNTY

Large groundwater resources in this part of Will County are developed primarily from the shallow dolomite formations of Silurian and Ordovician age and from the deep-lying Cambrian-Ordovician aquifer, of which the Glenwood-St. Peter and Ironton-Galesville sandstones are the most productive formations.

Wells tapping the shallow dolomite aquifers in the Joliet area range in depth from around 250 to 450 feet with the nonpumping water levels varying with topography but generally about 50 feet below land surface. Studies of shallow dolomite wells in western Will County show that the median specific capacity of individual wells is about 5.5 gpm/ft (yield per foot of drawdown), although specific capacities may range from less than 0.1 to more than 200 gpm/ft. Individual well yields range from near zero to around 500 gpm depending on the number, size, and degree of interconnection of the water-bearing openings intersected by the bore hole.

Water from the shallow dolomite aquifers is fairly highly mineralized (500 to 1200 ppm) and very hard (300 to 1000 ppm).

The Cambrian-Ordovician aquifer is the principal aquifer tapped for large groundwater supplies in the Joliet area. The primary water-bearing units of the aquifer are the Glenwood-St. Peter and Ironton-Galesville sandstones. Wells tapping the Cambrian-Ordovician aquifer in the vicinity of Joliet generally range in depth from about 1600 to 1700 feet. Nonpumping water levels are between about 0 and 50 feet above sea level (about 600 to 700 feet below land surface) and declining at a rate of about 12 feet/year. Studies of yields of deep sandstone wells in northern Illinois indicate that the deeper Ironton-Galesville sandstone is about three times as permeable as the upper Glenwood-St. Peter sandstone, and that wells penetrating the entire thickness of the Cambrian-Ordovician aquifer generally have specific capacities (yield per foot of drawdown) about 5 times greater than specific capacities of wells finished only in the Glenwood-St. Peter sandstone. The specific capacity of deep sandstone wells in the Joliet area is about 6.5 gpm/ft. Individual wells are pumped at rates from about 300 to 1000 gpm.

Water from the deep sandstones at Joliet is generally hard (250 to 300 ppm) and moderately mineralized (450 to 600 ppm).

The practical sustained yield of the deep sandstones in northeastern Illinois has been exceeded in recent years and the future cost of pumping water from this aquifer system will increase as water levels continue to decline. For this reason it is suggested that if possible, the industrial wells be completed in the shallow dolomite rather than the deep sandstones.

MORRIS, GRUNDY COUNTY

Available information indicates that in the vicinity of Morris large quantities of groundwater are generally obtained from the deep-lying Cambrian-Ordovician aquifer system. The municipal wells at Morris tapping the full thickness of this aquifer are about 1450 feet deep. The piezometric surface is near an elevation of about 450 feet above sea level (about 70 feet below ground level in Morris) and declining at a rate of about 4 to 5 feet per year. The specific capacity (yield per foot of drawdown) of a well tapping the Cambrian-Ordovician aquifer should be about 7 gpm/ft; a well tapping only the Glenwood-St. Peter sandstone should have a specific capacity of about 2 gpm/ft. Individual municipal wells at Morris tapping these aquifers are pumped at rates of 450 to 1000 gpm.

Water from the Cambrian-Ordovician aquifer at Morris is hard (250 to 300 ppm) and moderately mineralized (400 to 500 ppm). Objectionable concentrations of hydrogen sulfide gas may be encountered if the well is not completely sealed to a depth below the Galena-Platteville dolomite (300 to 350 feet).

OTTAWA, LA SALLE COUNTY

Groundwater for industrial use near Ottawa is generally obtained from the deep sandstone aquifers. Wells in Ottawa tapping the entire thickness of the Cambrian-Ordovician aquifer system are usually about 1150 to 1250 feet deep with a nonpumping water level near an elevation of 450 feet above sea level. Available data suggest the rate of water-level decline is about 1 to 2 feet/year. The specific capacity of wells tapping the entire Cambrian-Ordovician aquifer in LaSalle County ranges from about 5.3 to 16.1 gpm/ft with individual wells pumped at rates from about 350 to 1850 gpm. The specific capacity of wells penetrating only the Glenwood-St. Peter sandstone in this area ranges from about 0.3 to 5.0 gpm/ft with the wells pumped at rates from about 10 to 550 gpm.

Although the chemical quality of water from the three municipal wells at Ottawa is good, other wells drilled for the city have been abandoned because of a high salt content of the water they produced. An excerpt from our Bulletin 40 which describes the wells drilled for Ottawa and includes mineral analyses of the groundwater from these wells is enclosed.

HENRY, MARSHALL COUNTY

The attached records for the B. F. Goodrich wells near Henry, and excerpts from our Bulletin 40 for the nearby towns of Hennepin, Henry, and Lacon indicate that large quantities of groundwater in this area are usually obtained from permeable sand and gravel formations contained in the lower part of the partially buried bedrock valleys present along the Illinois River in this reach of the stream. Wells generally range in depth from about 65 to 110 feet deep with the nonpumping waber levels varying with topography from about 10 to 50 feet below land surface. Individual wells are pumped at rates up to about 550 gpm.

The water from the unconsolidated deposits at Henry is hard (300 to 400 ppm) and moderately mineralized (400 to 500 ppm).

The deep sandstones at Henry are very deeply buried and contain water too highly mineralized for most industrial uses.

FULTON, WHITESIDE COUNTY

Available information for the municipal wells at Thomson and Albany suggest that fairly large quantities of water may be developed from the deposits of water-bearing sand and gravel which underlie the lowland areas along the Mississippi River. These wells are about 80 to 85 feet deep with nonpumping water levels 10 to 15 feet below land surface. Production rates of several hundred gallons per minute with only a few feet of drawdown are possible from properly constructed and developed wells (see enclosed data for Thomson and Albany).

Water from the unconsolidated deposits at Thomson and Albany is moderately hard (150 to 300 ppm) and moderately mineralized (200 to 350 ppm).

Large municipal supplies in Whiteside County are generally obtained from the deep sandstone aquifers. Wells at Morrison and Fulton tapping the Cambrian-Ordovician aquifer are about 1550 to 1650 feet deep with nonpumping water levels between about 500 to 550 feet above sea level (100 to 150 feet below ground level in Fulton). The specific capacity of these wells is about 5 gpm/ft. Some deep sandstone wells in Whiteside County also penetrate the upper part of the deeper-lying Mt. Simon sandstone at depths of 1900 to 2000 feet. The specific capacity of these wells ranges from about 4.9 to 28.4 gpm/ft with a median specific capacity of about 11.0 gpm/ft. The wells are pumped at rates from about 350 to 500 gpm. However, the specific capacities are comparable to those obtained in other areas of northern Illinois so increased pumping rates should be possible.

The water from the deep sandstones at Fulton is hard (250 to 300 ppm) and moderately mineralized (300 to 350 ppm).